Seychelle – Bottoms-Up Water Bottle

www.seychelle.com

Device Information

The Bottoms-Up water bottle is a handheld sports type squeeze bottle. The bottle has a capacity of 0.89 L (30 oz). The bottle contains a filter cartridge consisting of an activated carbon block depth filter that is connected directly to the drink spout. The activated carbon filter is a 6 cm long hollow-core cylinder with a 0.6 cm thick wall. The bottle is filled from the bottom. The drink spout and filter cartridge are not removable from the bottle. During use water flows from outside through the filter wall into the hollow inside and out the drink spout. The carbon block filter has a 2 µm absolute pore size rating. Information provided by Seychelle claims this device removes or reduces 99.9% (3-log) *Cryptosporidium* oocysts and 99.99% (4-log) *Giardia* cysts, as well as various inorganic and organic chemical contaminants including tastes and odors. The bottle is not designed for virus removal and Seychelle recommends adding a disinfectant such as iodine or chlorine to remove viruses. Directions for use require the user to fill the bottle with water and squeeze to produce water. Prior to the first use the filter must be flushed with two bottles of water to remove filter particle fines. When storing the device, Seychelle recommends the filter be flushed with a chlorine solution (¼ tsp. per half-gallon of water) and allowed to dry. Replacement filters are not available.

Effectiveness Against Microbial Pathogens

No data was received showing the effectiveness of this product with respect to the U.S. Environmental Protection Agency (USEPA) Guide Standard Protocol for Testing Microbiological Water Purifiers (reference 1). The theory and practice of depth filtration has been widely studied and there has been significant research conducted on activated carbon block filtration (reference 2). In the absence of data specific to this device tested using reference 1, and based on general knowledge of depth and carbon block filtration, this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts to the required minimum log reductions stated in reference 1 (i.e., 3-log) when used as directed. It is not expected to consistently reduce bacteria (6-log) and viruses (4-log). Based on general depth and carbon block filtration information, the Bottoms-Up bottle is assigned one √ for the reduction of *Giardia* cysts and *Cryptosporidium* oocysts and an X for bacteria and virus reduction (for an explanation of the rating checks click here).

Table. Expected Performance Against Microbial Pathogens.

Microbial Pathogen Type	Expected Disinfection Capability	Evaluation Rating	Primary Pathogen Reduction Mechanism
Bacteria	> 6-log	X	-
Viruses	> 4-log	X	-
Giardia cysts	> 3-log	√	size exclusion
Cryptosporidium oocysts	> 3-log	√	size exclusion

Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. Because it is a squeeze bottle, the actual production rate is dependent on the user. The production capacity is stated at up to 760 L. However, production capacity will vary widely with raw water quality (i.e., turbidity).

Cleaning, Replacement, and End of Life Indicator

This device cannot be backwashed to remove sediment from the filter. When the device becomes unusable due to decreased production rate, the clogged filter must be replaced. The device contains no end of life indicator short of filter clogging.

Weight and Size

Dry weight	150 grams
Size (height x diameter)	26 cm x 8 cm

Cost

Bottoms-Up Bottle	$25.00

Device Evaluation

No data was received that challenged the Bottoms-Up bottle against reference 1. General research on depth and carbon block filtration indicates that this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts. This device is not likely

capable of consistently reducing bacteria and viruses. Additional treatment is necessary to remove bacteria and viruses such as adding a disinfectant (e.g., chlorine, iodine, chlorine dioxide) to the bottle prior to filtering. This device, like all filters with small pore sizes, is highly affected by turbid (cloudy) waters. Since the device is not able to be backwashed to remove accumulated particulates, once clogged, the filter must be replaced. There is no indicator of process failure or end of device useful life.

Advantages

- Expected to consistently provide adequate protection from *Giardia* cysts and *Cryptosporidium* oocysts, although device-specific testing data using the USEPA protocol is not available.
- No wait time prior to consumption.
- Simple and effective.
- Provide taste and odor reduction.

Disadvantages

- Not expected to be consistently effective against bacteria and viruses.
- Reduced production capacity when using high turbidity water.
- Not backwashable.
- No real-time indicator of process failure.

References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.

2. U.S. Army Center for Health Promotion and Preventive Medicine. (2005). *Technical Information Paper; Filtration in the Use of Individual Water Purification Devices*, Aberdeen Proving Ground, MD.